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Technology, on January 13th, elected Professor James M. Crafts, of the chemistry department, chairman *pro tem.* of the faculty, pending the election of a successor to the late Gen. F. A. Walker as President.

MR. G. A. HOBART, Vice-President elect, has given \$5,000 to Rutgers, of which he is a graduate.

#### DISCUSSION AND CORRESPONDENCE.

##### A NATIONAL DEPARTMENT OF SCIENCE.

TO THE EDITOR OF SCIENCE: I have just seen in the current number of SCIENCE Dr. Dabney's discussion of this subject, and, feeling that the natural inferences most persons unacquainted with government work would draw from it, must be not only inaccurate but mischievous, I feel obliged to point out that there are at least two sides to the question, and it is extremely doubtful whether the establishment of such a department would be beneficial to science, economical or efficient to a degree warranting the change.

With much that Dr. Dabney has written I am in accord; it is his conclusions, and the inferences to be drawn from his manner of presenting the facts, that demand further examination.

It is nothing new for people to assume that the proposal of a new set of well chosen names, a new classification of well known facts, or a cleverly drawn scheme of organization of previously distinct agencies, has in itself added something to knowledge, or possesses an inherent power of some undefined sort to make things easier, cheaper or better. Such assumptions are at the basis of nearly all cranky theories, as well as occasional good ones. No scientific man should accept such hypotheses without a thorough investigation of the facts.

I take it that the object of a scientific bureau is to gather, digest and disseminate facts in regard to matters with which it is officially charged. If this work is done promptly, efficiently and accurately, at a reasonable cost, the bureau justifies its existence, and not otherwise. It is of no consequence, whatever, to the bureau and its work whether it is attached to one department or another, or to none, if the bureau is conducted by a competent person on scientific principles, and with a view simply to getting

the best possible results. The origin and success of our scientific bureaus has been due, as Dr. Dabney points out, to the fact that they are, in the main, the crystallized result of individual effort exerted in a particular field and with the object of attaining certain definite ends.

The men to whom we owe our best scientific agencies under government, worked, and often gave their lives prematurely, not to get offices, or titles, or salaries, or to add a new name to the lists of bureaus in the blue books, but to promote research and benefit the nation by its results. This, too, has been the object of their successors in conscientious devotion. The danger and difficulty which has threatened the bureaus, and never more than at the present time, has been the intrusion of politics or personal interest in appointments, and the stifling of individual initiative by an excess of red tape, imposed generally in good faith by Congress with the idea of preventing abuses.

From Dr. Dabney's account it might be supposed that a number of bureaus were, to a greater or less extent, duplicating each other's work, and the inference is direct from his argument that this duplication might and should be prevented by a consolidation of the various bureaus. The supposition is, I believe, quite erroneous and the inference wholly fallacious.

The bureaus exist to do work, and the advisability of any change in organization must be measured by its capacity for increasing results, improving efficiency, and promoting economy without lessening the product measured in results. If consolidation would diminish results, impair efficiency, and do away with individual responsibility to any marked degree, it would be dearly bought. That this would be the case, under present conditions, there can be hardly any doubt; and the coolness with which the proposition, which is by no means new, has been met in Congress is, I am convinced, due to the fact that the more influential members, as good business men, recognize that the hypothesis is without the essentials of a workable scheme.

At present most of the bureaus are attached to some department. The head of that department has many divisions to supervise. In general, even if not specially interested in science

he is a man of broad views and good executive capacity. After satisfying himself that the proper official safeguards are observed in the bureau and that the head of it is competent and of good report, the Secretary rarely meddles with details—in fact, has no time to waste upon them.

The Director of the bureau can devote his energies to carrying on its work and maintaining proper supervision of details. If it is a bureau in which, say, chemical work is required, the laboratory occupies part of the quarters of the bureau, its operations are immediately adjacent to the offices of men whose work is being supplemented by chemical research, the supplies for the chemist are only those required for the work he is doing, and the latter is promoted by the constant opportunity of conference between the people interested. An experiment can be ordered, immediately taken up, the process altered or the scope enlarged while actually in progress, or it can be stopped to take up something of instant importance; in short, the laboratory is a tool in the hands of the bureau, which can be directed to exactly the work which is required without delay, interruption or interference. This promotes efficiency and the progress of science.

It is true that an unfriendly Secretary might wreck the scientific work of a bureau by getting rid of a competent and installing an incompetent Director. But this danger is not obviated by the suggested consolidation, and cannot be by anything short of a cordial acceptance of the merit principle of civil service reform by the whole executive body of the government. We are all agreed that that will be a happy day, but also that it has not yet dawned.

The head of the proposed department is to be a Cabinet officer, and hence necessarily changed with the changes of administration. It follows that he will be more or less of a politician and his appointment obtained by political methods. Having no other executive duties, and it being impossible that he should have a working knowledge of all of the scientific branches under his control, the tendency to meddle and modify would be almost irresistible. The Directors of the several bureaus, instead of attending to their business, would have to oc-

cupy themselves in protecting it against ill-advised interference.

The chemical laboratories being consolidated, the chief chemist would be a greater man than any of his colleagues. No Director of a bureau could control his own chemical work. With demands for particular jobs from several bureaus on hand it would be wholly uncertain when any of them would be finished. Complaints would be met by playing one off against another. Responsibility, and, to a large extent, efficiency, would be lost. Meanwhile no fewer men could do the chemical work than were required before. Instead of the quarters being included in the rent of the several bureaus, as now, a large and separate building would be called for and required. That a dollar would be saved by such a proceeding is doubtful. That delays and inefficiency would be inevitable is certain. It may be said that the above is a pessimistic view, but we have in the government printing office a brilliant example of the effects of consolidation, where it takes six months to a year to get a scientific book printed, and there is no responsibility whatever to the Department, whose work is entirely at the mercy of the public printer, who knows no superior and does as he likes. Those who have had experience with his office do not desire any further consolidations of the same kind.

Of course, the chemical laboratory has been merely taken as an illustration. The writer has nothing to do with such laboratories, but the principle holds good throughout.

Dr. Dabney has spoken of other instances of supposed duplication of work, or rather two parties doing the same kind of work. Any genuine duplication could be cured at once if pointed out, but, as before stated, the duplication is not real but nominal. Different sorts of work are called by the same name. There is no point of contact between the hydrology of the Geological Survey and the hydrography of the Navy Department. Methods which would disgrace the Coast Survey work have always been regarded as entirely sufficient in the Land Office. One kind costs twelve cents a mile, the other two hundred dollars. These are not duplications.

I do not for a moment claim that our govern-

mental methods are perfect, or that well considered changes may not in some cases be wholly desirable. All I desire to do is to point out that the nostrum now offered is by no means a cure-all, and that the attainment of ideal conditions depends almost wholly on an honest recognition by the whole country, as represented by Congress and the executive, of merit, fitness and resulting permanency of tenure in the staff of the scientific bureaus.

WASHINGTONIAN.

WASHINGTON, January 16, 1897.

#### THE JURASSIC WEALDEN (TITHONIAN) OF ENGLAND.

PROF. O. C. MARSH has called again attention to the Wealden formation of England—an abnormal deposit, rather puzzling. Every observer working at geographical geology and general classification has been struck by an enigma in the otherwise classical classification of the strata of England. Between the Portland stone at the island of Portland and at Durstone bay, and the Lower Greensand of the Middle Cretaceous, we have a series of beds, mainly sands and clays, with some limestone and dirt in the inferior part, which has been called a fluvio-marine and fresh-water formation, of a thickness of about 1,500 or 2,000 feet, designated generally by the name of Wealden. The name of 'Weald formation, or Wealden,' was first introduced in the English classification by P. I. Martin in 1828 (*A Geological Memoir on a Part of Western Sussex*, p. 40, 4to, London).

Dr. William H. Fitton accepted it, and in his celebrated memoir, *Observations on some of the strata between the C. . . . the Oxford oolite in the Southeast of England*, Trans. Geol. Soc. London, second series, Vol. IV., p. 103, London, 1836, gives a detailed account, dividing the Wealden into three great groups, called the Purbeck strata, Hastings sand and Weald clay proper.

Dr. Gideon A. Mantell is generally credited as the author of the stratigraphic position in English classification of the Wealden formation (*Illustrations of the Geology of Sussex*, 4to, London, 1827, and *A sketch of the Geological structure of the Southeastern part of Sussex*, Lewes, 1818).

He puts it as the lowest part of the Cretaceous formation.

The classification of Mantell was generally accepted until November, 1849, when Edward Forbes observed at Portland and Swanage that Fitton and Mantell made mistakes, especially in regard to the Purbeck marble series, and, after some close and excellent observations, recognized that the Purbeck was Jurassic and not Cretaceous. As he humorously says in a letter to Ramsay: "The 'geology of England' may be 'done' by the old fellows, but it is not overdone yet." (*Memoirs of Edward Forbes*, p. 461, London, 1861.) Edward Forbes was the man to correct errors of classification in regard to the Mesozoic and Tertiary. He has no equal for sharp observations and correct conclusions. Unhappily he was not able to finish his work; his premature death in 1854 arrested completely the researches he inaugurated so well in Dorset and the Isle of Wight. Even his work, as he has entitled it, 'A Description of the Purbeck and Wealden fresh-water and fluvio-marine strata of Dorsetshire and the Isle of Wight, with comparative remarks on synchronous strata elsewhere' (Preface, p. vii., *On the Tertiary fluvio-marine formation of the Isle of Wight*, London, 1856), was never published; only a short notice was given to the public in the British Association Report for 1850, under the title 'On the succession of organic remains in the Dorsetshire Purbecks.' However, short as it is, the notice of Forbes brought the age of the Wealden once more before the English geologists, and one of them who knew best the Secondary or Mesozoic formations, the nephew of the celebrated 'Strata Smith,' Prof. John Phillips, of the University of Oxford, in his remarkable *Manual of Geology*,\* pp. 282-318,

\* Extract from a letter of Prof. John Phillips to Jules Marcon. \* \* \* "As to the propriety of placing the Wealden in the Cretaceous I have my doubts. Certainly the fresh-water fossil remains, which otherwise are not characteristic of the age of strata, are not in favor of uniting the upper part of the Wealden with the Cretaceous, while the *Megalosaurus* and other Saurians, as well as the fishes and plants found in the Middle (Hastings Sands), protest loudly against the separation of the Wealden from the Oolites."

JOHN PHILLIPS.

ST. MARY'S LODGE, YORK, July 23, 1887.